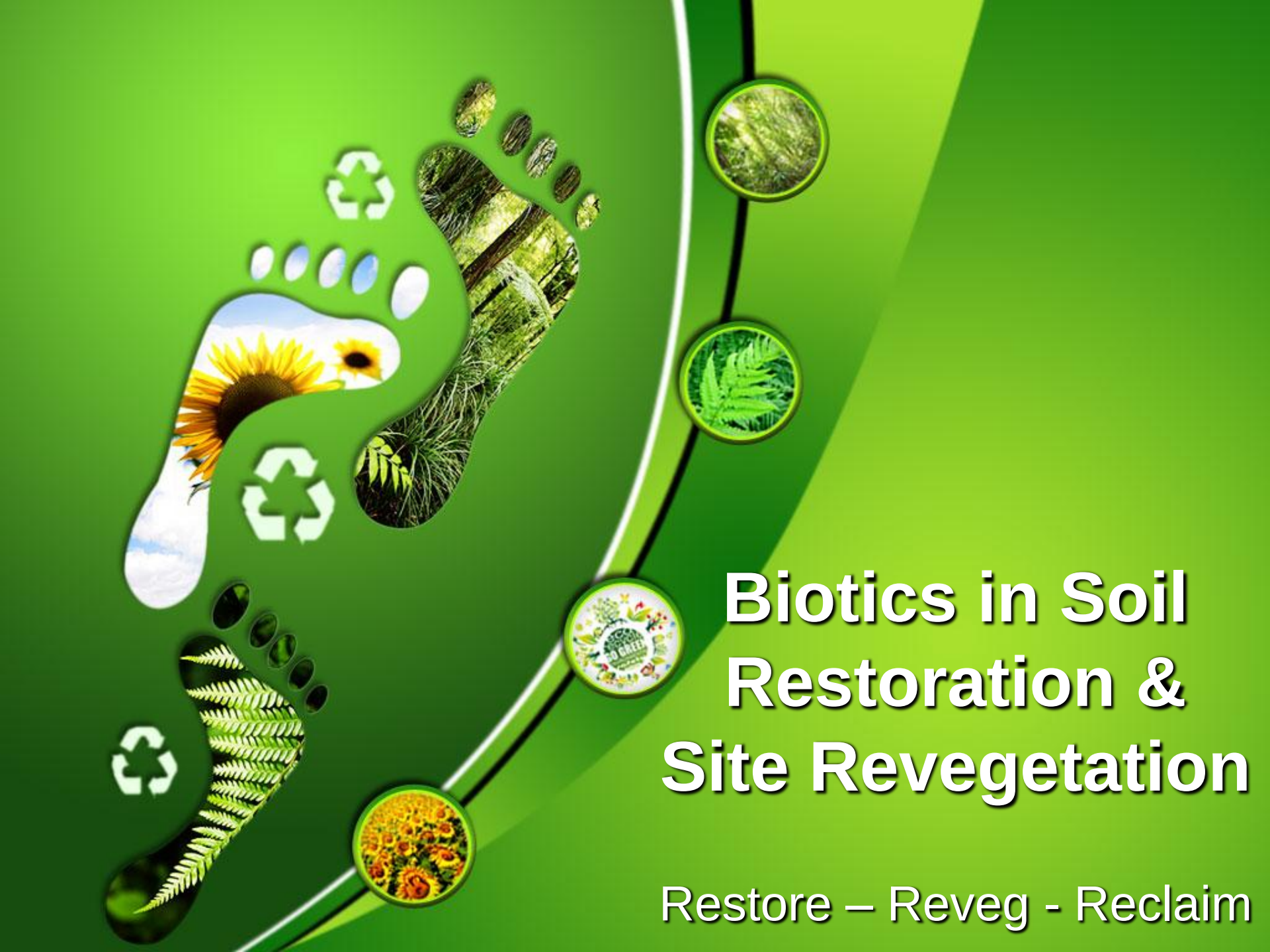

Biotics in Soil
Restoration &
Site Revegetation
Restore – Reveg - Reclaim

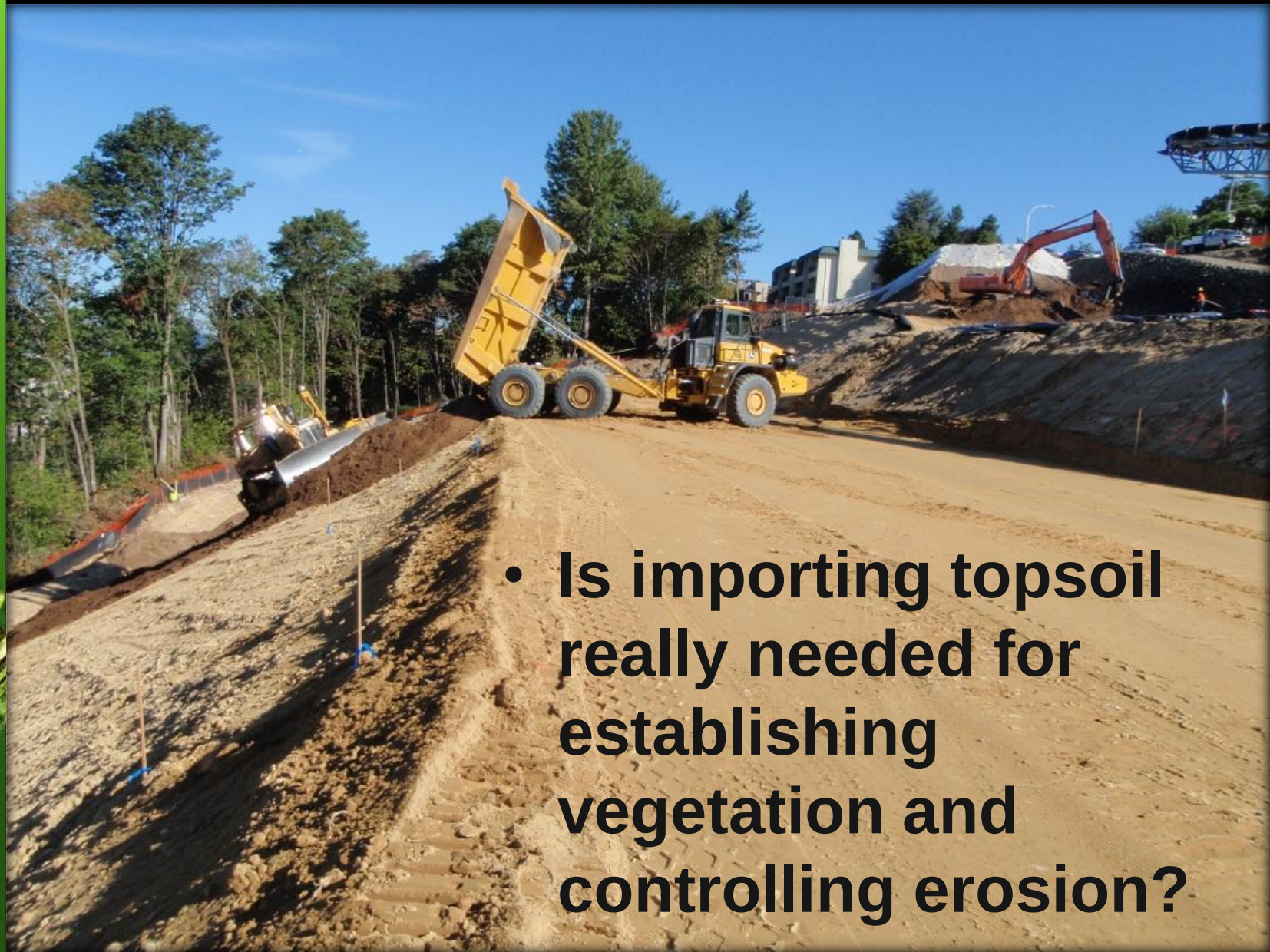
NEW SOLUTIONS

FOR THE SAME OLD PROBLEM





The Biotic Approach Asks…



- **Is importing topsoil really needed for establishing vegetation and controlling erosion?**

Conventional "Fixes"

- Sit upon the surface and focus more on immediate surface protection from detachment.

Good Erosion Control

- The function of biotic elements is soil improvement.
- They should promote natural microbial activity, and natural topsoil forming processes, the hallmarks of healthy vegetation-supporting soil systems.

Vegetation Performance Failures

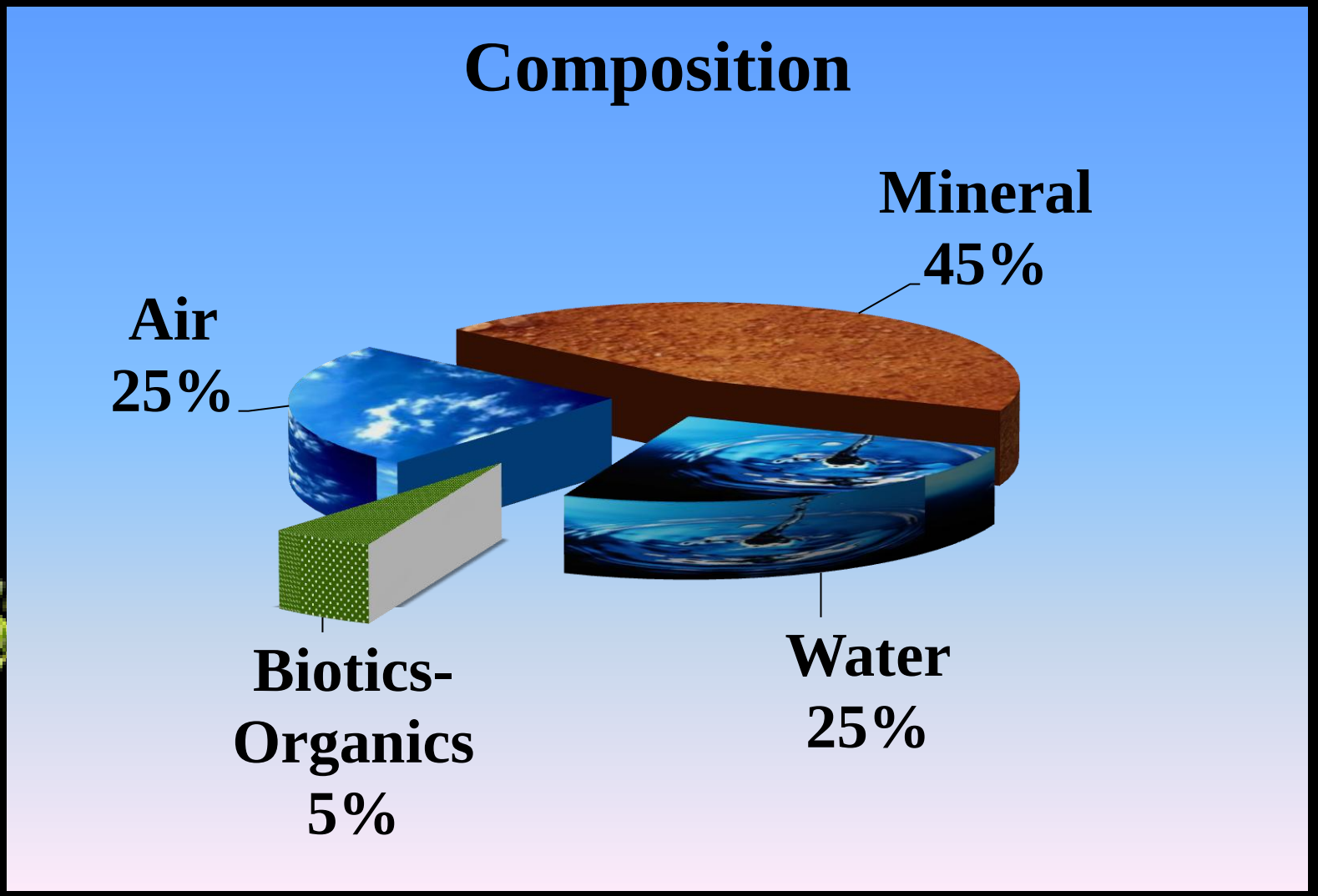
Without Biological Function

Vegetation is Unsustainable

Conventional Reactions

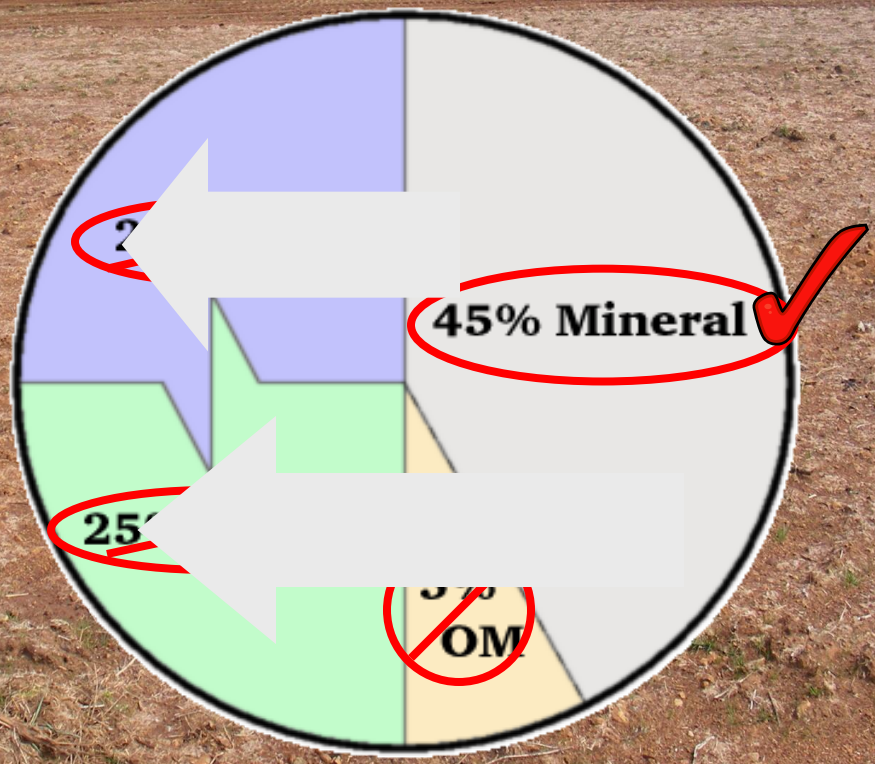
Apply Herbicides,
Chemicals,
Fertilizer & Re-seed

What is Soil?



What's Missing For Revegetation?

Biological Function



What sources of organic matter are available?

- **Peat Moss is a great source of organic matter and a favorable growing medium; and a renewable natural resource**
- **Compost may contain some nutrients however, frequently it is not consistent in texture, quality, and *may* import contaminants such as hydrocarbons, metals, pathogens, pesticides and weeds**

Why Peat Moss?

HONEYCOMB STRUCTURE

This photomicrograph of a peat moss particle shows it's natural capillary and porous structure (natural sponge). It increases the water and nutrient retention as compared with any other source of organic matter (compost, manure, wood, etc. The peat absorbs water and nutrients and avoids the leaching and loss of nutrients to the environment.

Why is it the most popular green house growing medium in the world?

What are Biotic Soil Amendments?

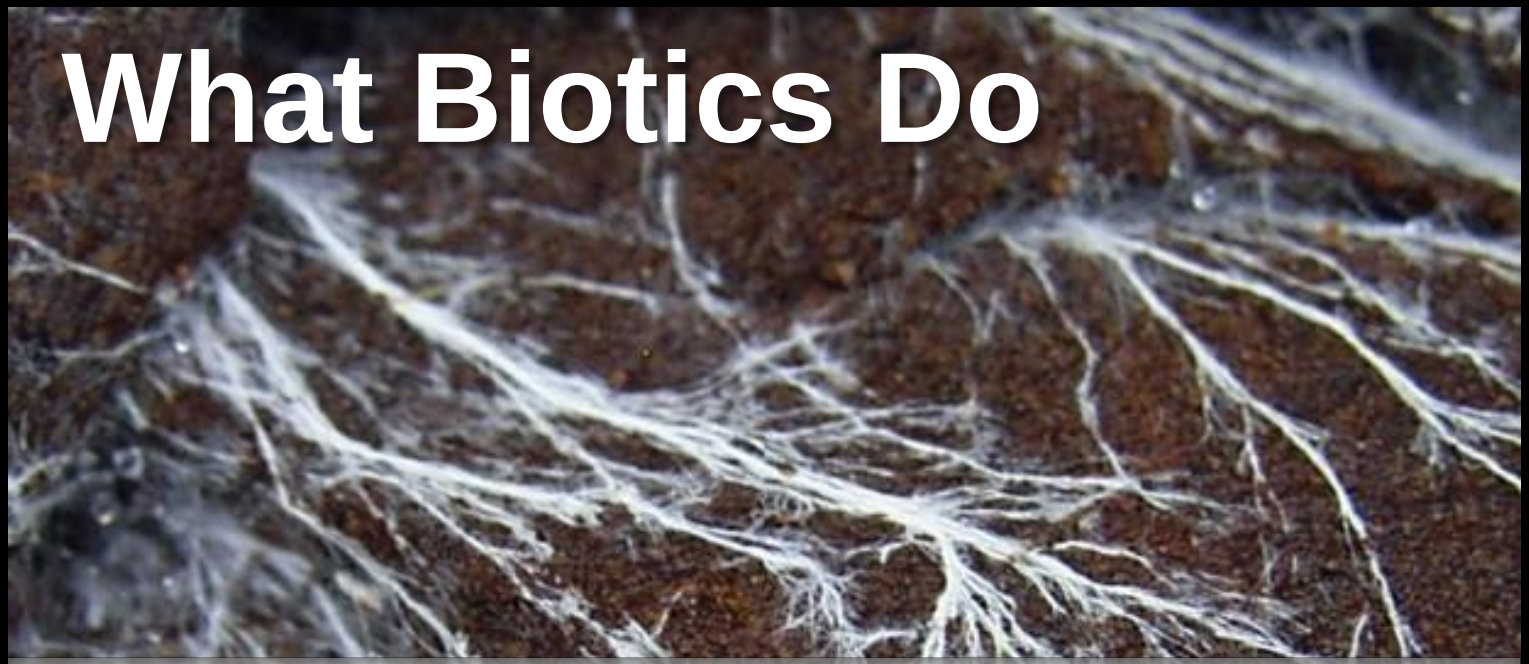
- 100% Recycled Soil Building Organics
  - ✓ Biochar
  - ✓ Humic Compounds
  - ✓ Degradable Fibers
    - ✓ Straw – Jute - Flax
  - ✓ Mycorrhizae and Microbes
    - ✓ Beneficial Bacteria
  - ✓ Water Retaining Organic Polymers
- Hydraulically or Broadcast Applied

DESIGNED USING BIO MIMICRY

Think of it as "innovation inspired by nature." The core idea is that nature, imaginative by necessity, has already solved many of the problems we are grappling with today. Plants, animals, and microbes are the consummate engineers. They have found what works, what is appropriate, and most important, what lasts here on Earth. This is the real news of bio mimicry: After 4.2 billion years of research and development, failures are fossils, and the successes are living all around us!

Bio mimicry 3.8

What Biotics Do



- Restore Biological Function
- Mimic Natural Processes
- Improve Plant Establishment
- Ensure Project Success
- Save Money!

How Biotics Work!

Why Biochar?

- Optimum Microbial Host
- Mycorrhizal-Microbial Interaction
- Soil Structure
  - Water Retention-Filtering
  - Porosity
  - CEC-
  - Permeability

No Char With Char

Sustainability: A Challenge

Habitat

Germination

Just Add Water

IT STARTS HERE

Case Study: Wyeth OR

- PermaMatrix Applied October 4th 2010

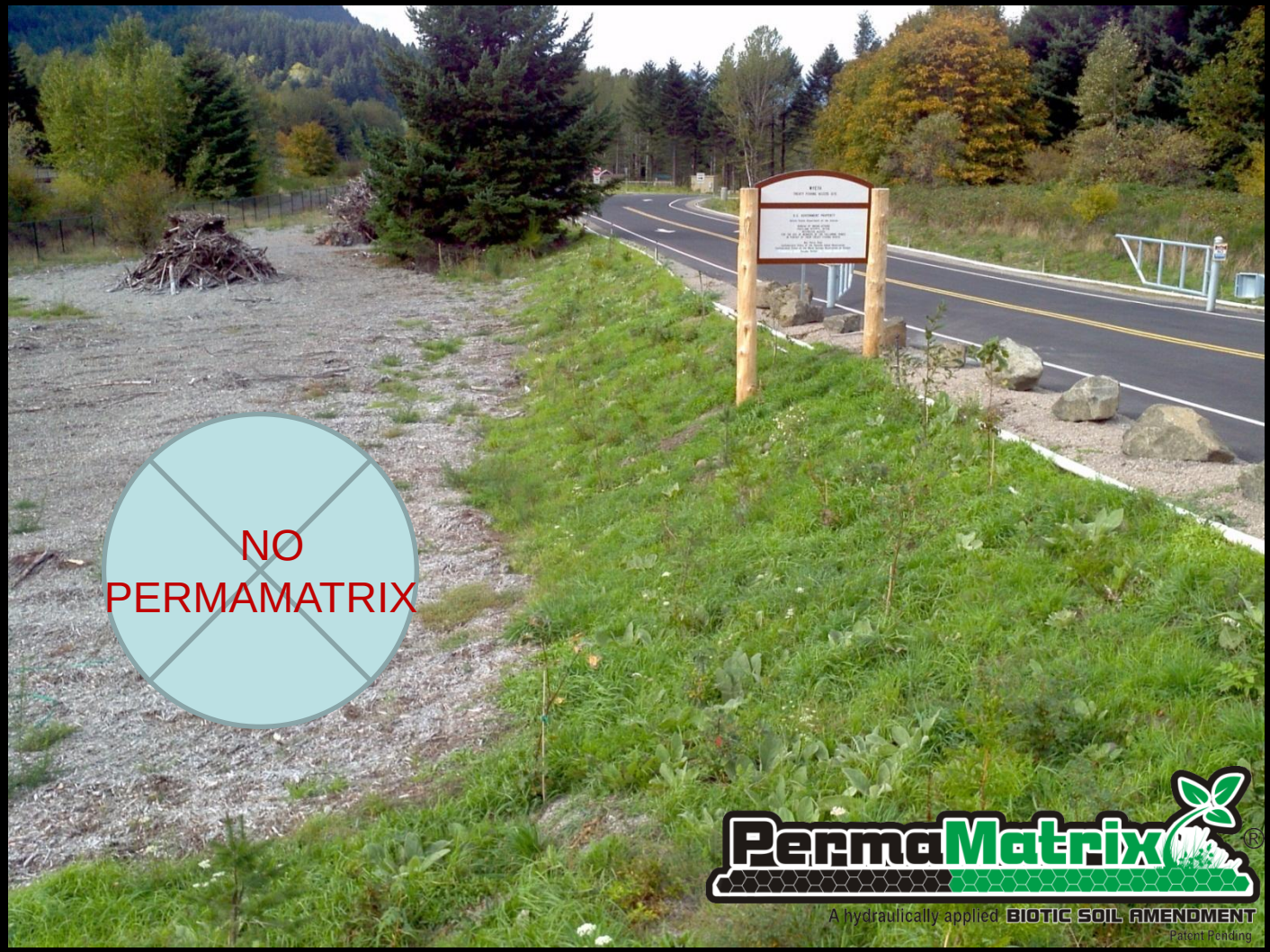
Case Study: Wyeth OR

- PermaMatrix Applied October 4th 2010

Case Study: Wyeth OR

- PermaMatrix Full Native Cover Spring 2011

Case Study: Wyeth OR



- PermaMatrix On Right of Photo

Case Study: Wyeth OR

- PermaMatrix in swale areas established sedge and rush species from seed to mature plants that went to seed head in the 1st year!

Case Study: Wyeth OR

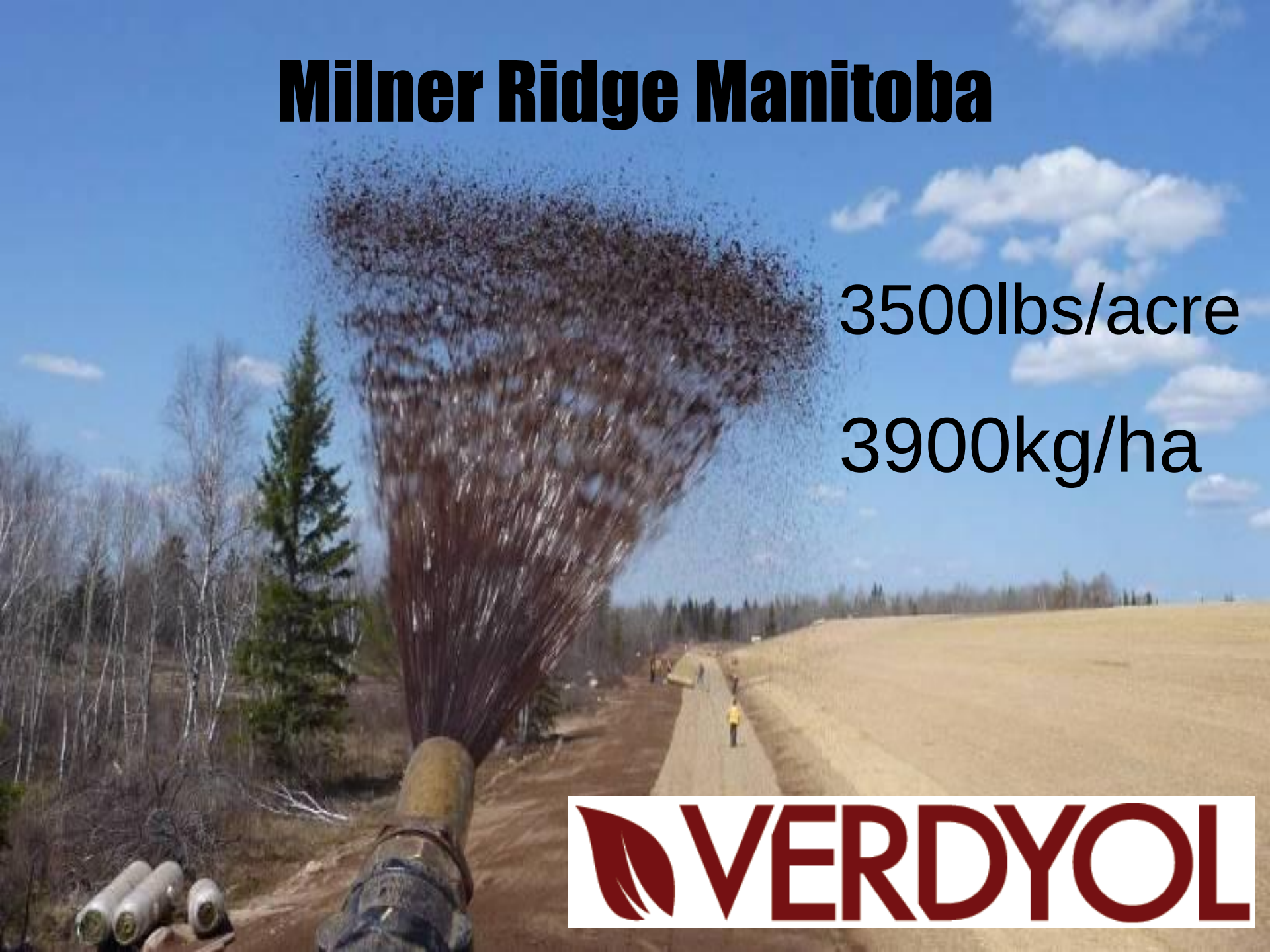
- Spring 2012 No Additional Inputs!

Milner Ridge Manitoba

- Government of Manitoba
- Medium security jail
- 70,000 square meter waste water pond

- PROBLEM
  - Very sandy material
  - marginal natural topsoil – not reclaimable

Milner Ridge Manitoba




Seed and
fertilizer added
right in the mix


2 weeks later


3 weeks later


7 weeks later


13 Weeks later


14 Months later


Effects of mycorrhizea
(a strong root system)


Biotic layer mimics the natural O horizon

Case Study: Stormwater Basin

Poor Drainage and Discharge
Winter 2009

Soils were Screened and reused
January 2010

PermaMatrix used with Native Seed Mix
Feb. 2010

April 2010

PermaMatrix®
A hydraulically applied BIOTIC SOIL AMENDMENT
Patent Pending

Case Study: Stormwater Basin

PermaMatrix®

A hydraulically applied BIOTIC SOIL AMENDMENT

Patent Pending

Case Study: Road Cut

Back to the Start

Take The Challenge

- Agencies
  - ✓ Require Successful Natural Processes
- Architects & Engineers
  - ✓ Design Sustainable Systems
- Contractors
  - ✓ Drive New Technologies
- Advocates
  - ✓ Demand Change

Alex Zimmerman CPESC, CISEC, CESSWI
AK-BC-WA-CESCL
360-910-4800
azim07@comcast.net

PermaMatrix®

A hydraulically applied BIOTIC SOIL AMENDMENT

Patent Pending

Revegetation Current Practices